

GAO

Report to the Chairman, Subcommittee  
on National Security, Veterans Affairs,  
and International Relations, Committee  
on Government Reform, House of  
Representatives

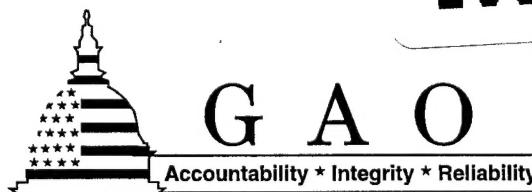
August 2000

# DEFENSE ACQUISITIONS

Recent F-22  
Production Cost  
Estimates Exceeded  
Congressional  
Limitation



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United States General Accounting Office  
Washington, D.C. 20548

National Security and  
International Affairs Division

B-285360

August 15, 2000

The Honorable Christopher Shays  
Chairman, Subcommittee on National Security,  
Veterans Affairs, and International Relations  
Committee on Government Reform  
House of Representatives

Dear Mr. Chairman:

The Air Force F-22 Raptor is an air superiority aircraft being developed to replace F-15 fighter aircraft. Lockheed Martin Corporation and Pratt & Whitney Corporation are the contractors for the airframe and engine, respectively. Development, which started in 1991, is scheduled to be completed in August 2003. The Air Force plans to enter low-rate initial production in December 2000.

Projections of higher production costs have been a source of concern for several years. In 1996, because of potential cost increases, the Air Force established a team—known as the Joint Estimating Team—to review the total estimated cost of the F-22 program. The team concluded that the cost of production could grow substantially from the amounts planned, but that cost reduction initiatives could be implemented to offset that cost growth. The Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics generally adopted the team's recommendations to change certain aspects of the program as well as a plan to define and implement cost reduction initiatives. F-22 production costs were also discussed in the National Defense Authorization Act for Fiscal Year 1998 (P.L. 105-85, Nov. 18, 1997). That act limited the total cost of F-22 production but did not specify the total number of aircraft to be procured. The most recent production costs estimates were completed by the Air Force and the Office of the Secretary of Defense in late 1999. The Air Force's estimate of \$40.8 billion and the Office of the Secretary's estimate of \$48.6 billion both considered the potential impact of cost reduction initiatives known as production cost reduction plans. The airframe and engine contractors had identified about 1,240 of these plans—totaling \$21 billion—in participation with the Air Force's F-22 program office. The Under Secretary of Defense for Acquisition, Technology, and Logistics reviews the status of the F-22 program quarterly, including its cost and affordability.

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You asked us to determine the impact these production cost reduction plans are projected to have on the program's production cost estimate. This report discusses (1) the status of cost reduction plans, including some plans not yet implemented, and Air Force procedures for reporting on the plans and (2) a comparison of the 1999 production cost estimates with the congressional cost limitation.

To assess the status of cost reduction plans, we reviewed documentation from the contractors and discussed the plans and the Air Force procedures for reporting on such plans with contractor and Air Force officials. To evaluate a sample of the cost reduction plans, we judgmentally selected 10 of the plans that were projected to have high dollar values. The estimated reductions from these plans were \$6.8 billion. Our objectives, scope, and methodology are described in appendix I.

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## Results in Brief

About half of the \$21.0 billion in cost reductions identified by the F-22 contractors and program office have not yet been implemented. However, the Air Force may not be able to achieve the expected results from some of the plans because they are beyond the Air Force's ability to control. We reviewed 10 plans estimated to reduce costs by \$6.8 billion. We found that cost reductions for four of the plans, which accounted for \$5.6 billion in potential cost reductions, may not be achievable because they were dependent on decisions or later determinations that must be made by the Office of the Secretary of Defense or the Congress. For example, one cost reduction plan estimated to reduce F-22 production costs by about \$1.5 billion requires congressional approval for multiyear procurement of the F-22. The other six plans we reviewed, which were estimated to reduce costs by \$1.2 billion may be achievable. Although the Air Force and its contractors have procedures to track the status of the production cost reduction plans, and the Air Force has reported quarterly to the Under Secretary of Defense concerning the total estimated cost of F-22 production, the Air Force reports have not regularly included a summary of the status of production cost reduction plans.

Both Office of the Secretary and Air Force cost estimators projected F-22 production costs that exceeded the congressional cost limitation of \$39.8 billion in effect at that time. In 1999, after considering the potential of all the cost reduction plans, the Air Force estimated F-22 production costs at \$40.8 billion, and the Office of the Secretary of Defense estimated production costs at \$48.6 billion. In comparing the cost estimates, we found the following:

- Although both estimates were based on the production of 339 aircraft, the two estimating groups did not use the same estimating methods, nor did they make the same estimating assumptions.
- The cost estimators did not make the same assumptions about which cost reduction plans were already implemented or about the cost reductions achievable from plans not yet implemented. Accordingly, the cost estimators differed in the amounts of plans they considered implemented or not yet implemented. For example, for cost reduction plans that were not yet implemented, the Air Force's estimating group allowed \$10.2 billion (of the total estimate of \$10.8 billion) for potential future cost reductions, and estimators from the Office of the Secretary allowed \$6.1 billion.
- The Office of the Secretary's estimate of F-22 total production cost exceeded the Air Force's estimate by \$7.8 billion, or 19 percent. The difference is attributable to the Office's higher estimates of the cost of production (\$3.7 billion) and lower estimates of the impact of production cost reduction plans not yet implemented (\$4.1 billion). The Office of the Secretary cost estimates exceeded the congressional cost limitation by about \$ 8.8 billion. Putting the higher estimate in perspective, if the Office of the Secretary estimate is correct and additional cost reduction plans are not developed and implemented, we estimate that the Air Force would have to buy about 85 fewer F-22 aircraft than now planned to stay within the congressional cost limitation.
- Although Air Force cost estimators projected a total of \$40.8 billion in production costs, the official Air Force cost position was \$39.8 billion, the same as the congressional cost limitation. Air Force officials said that the Air Force selected the \$39.8 billion as its official cost estimate because the detailed breakout of the estimate for fiscal years 2001 through 2005 was about the same as that budgeted for those years. They said the difference between the estimate and the budget is primarily associated with the estimate for years after 2005. Department of Defense officials noted that it will be some time before actual production cost trends emerge and before they will know whether the Air Force or Office of the Secretary of Defense estimate is more realistic.

This report provides recommendations to the Secretary of Defense that focus on (1) the need for regular Air Force reports that summarize the status of cost reduction plans and (2) reconciling the requirement for F-22s with the congressional cost limitation and assessing the implications of having to procure fewer F-22s because of potentially higher costs. The

Department of Defense, in commenting on a draft of this report, did not agree with our first recommendation because it believes that the Department has sufficient mechanisms in place to monitor F-22 costs, and that additional direction from the Secretary of Defense regarding reporting of that information was not warranted. We believe that achievement of the cost reduction plans is so critical to completing F-22 production within the cost limitation that quarterly reports that include a summary of the status of the plans would be important and useful. We modified our first recommendation to more specifically state the type of information the Department should review each quarter. The Department partially agreed with our second recommendation that requirements for F-22s be reconciled with the congressional cost limitation, stating that an upcoming Quadrennial Defense Review will accomplish such a reconciliation, but that it is now premature to make a reconciliation. We believe the Department's upcoming review will be responsive to our recommendation.

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## Significant F-22 Cost Reduction Plans Depend on Congressional or Defense Department Action

About half of the \$21.0 billion in cost reductions identified by the F-22 contractors and program office have not yet been implemented. These proposed cost reduction plans affect production technology, manufacturing techniques, and acquisition practices. We reviewed plans estimated to reduce future costs by \$6.8 billion. We found that cost reductions of \$5.6 billion of the \$6.8 billion were dependent on decisions or future determinations by the Office of the Secretary of Defense or the Congress; consequently, the Air Force may not realize all of the cost reductions it anticipates. We did not question the validity of plans estimated to reduce costs by \$1.2 billion. The Air Force and the airframe and engine contractors have procedures to track the status of each cost reduction plan, but Air Force quarterly reports to the Under Secretary of Defense for Acquisition, Technology, and Logistics have not always included status information on the plans.

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### Description of the Cost Reduction Plans

In response to recommendations of the Joint Estimating Team, contractors and the F-22 program office proposed cost reduction plans to use enhanced production technology, improved manufacturing techniques, and revised acquisition principles to buy materials. These plans show changes to business design, processes, and practices to realize cost reductions. The Air Force and contractors' criteria for determining if a cost reduction plan is implemented include whether

- the contractor has submitted a firm-fixed price proposal that recognizes the impact of the cost reduction,
- the impact of the reduction has been reflected in a current contract price—either with the prime contractor (Lockheed Martin) or a supplier to the prime contractor,
- the contractor has reduced the standard number of hours allocated to a specific task,
- the reduction has been negotiated in a forward pricing rate agreement,<sup>1</sup> or
- the reduction has been negotiated with a subcontractor or vendor.

Plans are categorized as “to be implemented” if none of the criteria are met.

The contractors estimated the value of the F-22 production cost reduction plans at about \$21.0 billion. The cost reductions and the contractor-reported status of plans are described in table 1. The table is a summary of the inventory of cost reduction plans as defined by the contractors. However, it does not show a relationship of the total cost reductions to the total estimated cost of F-22 production and is not readily reconciled with total production cost estimates made by the Air Force and the Office of the Secretary. Cost estimators of the Air Force and Office of the Secretary used these plans in making cost estimates for F-22 production; however, they did not always agree on what plans were implemented.

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**Table 1: Summary of Contractors’ Production Cost Reduction Plans**

Reason for reduction	Implemented	To be implemented	Total
Improve manufacturing processes and incorporate new technology	\$2.7	\$5.2	\$7.9
Improve efficiency and reduce supplier costs	2.0	1.7	3.7
Resolve obsolescence and diminishing sources issues	1.3	0.3	1.6
Improve material procurement strategies	0.7	0.3	1.0
Apply performance-based contracting practices	0.5	0	0.5

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<sup>1</sup> A written agreement negotiated between a contractor and the government to make certain rates available during a specified period for use in pricing contracts or modifications. These rates cover such things as labor and indirect costs.

(Continued From Previous Page)

Then-year dollars in billions

<b>Reason for reduction</b>	<b>Implemented</b>	<b>To be implemented</b>	<b>Total</b>
Defer or avoid government investment in depot maintenance capability	3.0	0.3	3.3
Award production contracts for multiple years	0	1.8	1.8
Manufacture Joint Strike Fighter and F-22 components in the same plants	0	1.2	1.2
<b>Total</b>	<b>\$10.2</b>	<b>\$10.8</b>	<b>\$21.0</b>

Note: The F-22 program office provided input to the contractors' plans.

Source: F-22 program office data.

Allocated equally over a planned procurement of 339 F-22 aircraft, a \$21-billion cost reduction equates to about \$62 million per F-22 to be produced. This amount of reduction per F-22, if achievable, is significant. For example, F-15E aircraft, derivatives of the F-15C that the F-22 is planned to replace, were procured in fiscal years 1996-1998 at an average unit cost of about \$46 million. Although that procurement occurred several years ago and the amounts are not fully comparable to the costs that might be incurred if they were to be procured today, the comparison shows the significance of the planned cost reductions.

#### Implementation of Some Remaining Cost Reduction Plans Not Ensured

Achievement of cost reductions of at least \$5.6 billion will depend on decisions and future determinations of the Office of the Secretary of Defense and/or the Congress. Thus, the Air Force cannot control implementation of those cost reduction plans. The plans involve cost reductions that would result from deferring establishment of a depot-level maintenance capability for the F-22, a favorable impact on F-22 costs if the Congress approves acquisition of the Joint Strike Fighter, approval of multiyear procurement of the F-22, and use of materials from the National Defense Stockpile Center for production of F-22s.

- One plan estimates a cost reduction of about \$2.6 billion and proposes that all F-22 depot-level maintenance be performed by the contractor until at least 2008. Under this proposal, the Air Force would not have to develop a capability to perform depot-level maintenance during production and would thus save production costs. Before this plan can be implemented, the Secretary of the Air Force must determine it conforms to 10 U.S.C. 2464 and 10 U.S.C. 2466, both of which affect the Air Force's ability to contract with the private sector for depot-level maintenance services. Section 2464 requires the Secretary of Defense to identify and maintain a core logistics capability that is owned and

operated by the government. A core capability is the equipment, personnel, and services needed to repair or maintain weapon systems or other military equipment to ensure an effective and timely response to mobilization, national defense contingencies, or other emergencies. Section 2466 governs the allocation of depot-level maintenance workload between the public and private sectors and stipulates that not more than 50 percent of the available funds for depot-level maintenance in a fiscal year can be used for contracting with the private sector. This percentage applies to each military department.

A decision to contract for depot-level maintenance will need to consider the requirements of these statutes. Under section 2464, it may not be possible to contract for all depot-level maintenance services if there is the need to maintain a core logistics capability for the F-22 within the Air Force. Concerning section 2466, as of March 2000, preliminary data indicate that the Air Force would be close to the 50 percent ceiling through 2004. In addition, Air Force long-term contracts for depot maintenance are expected to increase in value and the Air Force is implementing initiatives to contract for depot maintenance on 64 new or modified systems.<sup>2</sup> As a result of these statutory provisions, the potential exists that this proposed cost reduction plan might not be implemented.

The plan may only defer costs until after completion of production. The plan states that its purpose is to achieve a cost reduction by delaying the establishment of government depot capabilities until the system matures, which is defined as accumulating 100,000 flying hours in fiscal year 2008. It also states that the contractor support concept will be implemented to reduce the required depot investment and that most of that expense to develop an Air Force capability will be deferred until about 2012. The last buy of F-22 production aircraft is scheduled for fiscal year 2011. The Air Force would decide at that time whether to fund the costs of an Air Force depot-maintenance capability with procurement or operation and maintenance appropriations. If these costs are deferred until after the F-22 production program is complete, they will no longer count against the congressional cost limitation.

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<sup>2</sup> *Depot Maintenance: Air Force Faces Challenges in Managing to 50-50 Ceiling* (GAO/T-NSIAD-00-112, Mar. 3, 2000).

- Another cost reduction plan that is dependent on decisions by the Congress and the Office of the Secretary estimates that F-22 costs will be reduced by about \$1.05 billion through lower overhead rates and increased buying power, since many of the same contractors and subcontractors that are building the F-22 will also build the Joint Strike Fighter. The Congress and the Office of the Secretary control the schedule and quantity of the Joint Strike Fighter aircraft. Therefore, this cost reduction is dependent on decisions being made on a program external to the F-22. If the Joint Strike Fighter program is not approved or is delayed, then the F-22 production program will not achieve the projected cost reductions.
- Another cost reduction plan requires the Congress to approve multiyear procurement of the F-22, which the airframe contractor estimates will reduce the cost of F-22 production by about \$1.5 billion. The contractor proposes that F-22 production be contracted for 5 years in advance, beginning in 2004. According to the plan, because of cost reductions available through long-term commitments such as a 5-year contract, the subcontractors and the contractor would accept lower prices for the aircraft being procured. Under 10 U.S.C. 2306b, a multiyear contract must meet specific criteria and be approved by the Congress before any reductions from this type of cost reduction plan can be achieved. The criteria that must be met include the following: (1) the multiyear contract must result in substantial savings compared to awarding annual contracts; (2) the item being bought must have a stable design and not have excessive technical risks; and (3) the estimated cost of the system and the estimated cost avoidance from the multiyear procurement are realistic. The Air Force plans to award a multiyear contract for fiscal year 2004 and will need congressional approval for a multiyear contract in fiscal year 2003 to support advance procurement funding.<sup>3</sup> Since the F-22 development program is not scheduled for completion until August 2003, the potential exists that the F-22 program will not meet the multiyear procurement criteria by 2003.
- Another cost reduction plan of uncertain status involves obtaining titanium sponge from the Defense Logistics Agency's National Defense Stockpile Center at no cost and providing it to the manufacturer instead of paying the manufacturer for the raw material. This plan is estimated to ultimately reduce the production cost of the F-22 by \$458 million. It

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<sup>3</sup> Advance procurement funding is often requested by the Air Force to initiate procurement of the long lead-time materials and effort that are necessary to ensure that the delivery schedule can be met for aircraft that are to be procured in the next fiscal year.

assumes that the cost of titanium sponge would be \$3.00 per pound if purchased by the contractor and that about 30 million pounds would be needed. It further assumes that the funds not expended for titanium sponge, about \$90 million, would be used to invest in additional cost reduction plans, and thus reduce the total cost by \$458 million. Although the plan assumes that \$4.00 to \$5.00 in cost reductions will be achieved for each dollar invested, the contractor and the Air Force have not identified the specific projects in which the funds would be invested. This plan was not used to reduce estimated production costs by either cost estimators from the Office of the Secretary or the Air Force because of the uncertainty of congressional approval.

Although this plan might reduce F-22 production costs, the cost to the government would not be reduced by that amount. If the National Defense Stockpile Center does not give titanium sponge to the F-22 program, it can sell it to the private sector and create income for its own fund. In fiscal year 1999, the Center's sales of titanium sponge averaged \$1.94 per pound. Since the Air Force will need about 30 million pounds of titanium sponge for F-22 production, the lost revenue to the Center could be about \$60 million (\$1.94 per pound times 30 million pounds). Therefore, what may be a significant cost reduction for the F-22 program could result in some lost revenue for the Defense Logistics Agency.

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**Individual Plans Tracked but Regular Reporting Not Accomplished**

The Air Force and airframe and engine contractors have established procedures to track the status of the production cost reduction plans. Both contractors have developed an information system that records the identified cost reduction plans, the expected cost reduction from each of them, and their implementation status. The systems and the procedures were established to generate, evaluate, and implement cost reduction plans as well as to monitor them.

Air Force and airframe contractor representatives meet quarterly to review the status of cost reduction plans, while the Air Force and engine contractor representatives meet weekly to review the status of proposed cost reduction actions. The Air Force monitors the status of the cost reduction plans in their information system using the integrated product team structure. Through this structure, Air Force and contractor personnel serve on teams to manage various functions in aircraft development and production. For the F-22, the teams represent areas such as air vehicle, engine, and avionics. Among their other responsibilities, these teams also

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generate, evaluate, implement, and monitor the status of cost reduction plans.

The Under Secretary of Defense for Acquisition, Technology, and Logistics requested the Air Force to report quarterly on the status of F-22 costs. The Air Force reported quarterly, detailing many factors affecting F-22 costs. However, even though achieving the planned cost reductions is critical for completing F-22 production within the congressional limitation, Air Force quarterly reports to the Under Secretary have not included status information on cost reduction plans since June 1999. The data are available to make detailed or summary reports. For example, the Air Force is able to categorize plans as implemented or yet to be implemented and to perform specific searches of the contractor's information system.

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## Recent Office of the Secretary and Air Force Estimates Exceeded the Congressional Cost Limitation

The Air Force and the Office of the Secretary cost estimating groups both based their estimates on production of 339 aircraft, but they did not use the same methods to estimate the cost of F-22 production, nor did they use the same assumptions about which cost reduction plans were implemented or not yet implemented. After considering the potential cost reductions, both estimates (\$40.8 billion by the Air Force, and \$48.6 billion by the Office of the Secretary) exceeded the congressional cost limitation of \$39.8 billion that was in effect at the time the estimates were prepared. However, the Air Force used the cost limitation as its cost position.

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## Differences Between the Air Force and the Office of the Secretary Estimates

The two groups used different estimating methods, such as different assumptions regarding (1) production rates, (2) the impact of breaks in production, and (3) which historical data to use. These differences caused the Office of the Secretary estimate to be higher than the Air Force estimate for the following reasons:

- Air Force cost estimators assumed that the eight production representative test vehicles approved for purchase in fiscal years 1999 and 2000 would generally be produced as two lots of four aircraft each, based on the contractors' delivery schedules. Office of the Secretary estimators treated the eight aircraft as a single lot of eight aircraft for estimating purposes.
- Office of the Secretary and Air Force cost estimators disagreed on whether a break in production on four avionics items occurred. Air Force estimators assumed there was a break in production of certain items. They assumed that after a break in production, the higher rate of

cost improvement normally experienced in manufacturing early units would again be experienced after a break in production. Office of the Secretary estimators did not assume there was a break in production so, according to their analysis, the higher rate of cost improvement would not occur on the later units.

- The Air Force and the Office of the Secretary used different historical cost data to estimate the cost of the F-22 avionics. For example, the Air Force used experience on F/A-18 avionics and the Office of the Secretary used experience on multiple systems.

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**Different Allowances for Cost Reduction Plans Yet to Be Implemented**

The Air Force estimated that costs would be reduced by \$10.2 billion as additional cost reduction plans are implemented, while the Office of the Secretary estimated they would achieve \$6.1 billion. Among the reasons for the different amounts allowed for additional reductions are that the estimators used different baselines from which to calculate a reduction, different estimated returns on funds invested to reduce costs, and different assumptions on the percent of reductions likely to occur by eliminating nonproductive steps. As a result of the differences, the Office of the Secretary allowed less for cost reductions than the Air Force. Examples of these differences are as follows:

- Office of the Secretary and Air Force estimators agreed on the percentage to reduce the estimated cost as a result of awarding contracts for 5 years in advance (that is, multiyear procurement), but since their baseline estimates against which the percentage was applied were different, the amount of the expected reduction was different.
- Some cost reduction actions involve investing funds to bring about lower costs; that is, they involve investing in projects to improve manufacturing processes or incorporate new technology. Both the Air Force and the Office of the Secretary used C-17 cargo aircraft historical data to estimate the return on the dollars invested. Because of different methodologies to assess the cost reductions applicable to the invested dollars, however, the Air Force and the Office of the Secretary differed on the cost reductions applicable to the plans. The Air Force assumed that the return on an invested dollar would be \$11.00, \$9.00, or \$6.00 depending on the numbers of aircraft that would be affected by the improved process or technology. The Office of the Secretary's analysis calculated the cost reduction based on the amount of dollars that remained to be spent on the program. The Office of the Secretary's analysis resulted in a return rate of \$4.00 for each dollar invested.

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- Other cost reductions result from improving contractor efficiencies and reducing supplier costs. The Air Force used reductions from 9 percent to 13.5 percent depending on the planned work location. The Office of the Secretary used 5 percent as a general reduction percentage for all work locations.

According to Air Force officials, there were some differences because the two estimating groups used different assumptions about which plans were already implemented. For example, the Office of the Secretary considered about \$1 billion in reductions associated with the Joint Strike Fighter and radar production as implemented. Because the Joint Strike Fighter has not been approved for production, the Air Force did not consider that cost reduction to have been implemented.

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#### Comparison of Estimates With Congressional Limitation

As shown in table 2, the Air Force estimate was \$40.8 billion after allowing for \$10.2 billion of additional expected cost reductions that have not been implemented. The Office of the Secretary estimate was \$48.6 billion after allowing \$6.1 billion for additional cost reductions that have not been implemented. Both of these estimates exceeded the cost limitation of \$39.8 billion in effect at that time.<sup>4</sup>

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**Table 2: Production Cost Estimates for the F-22**

Then-year dollars in billions

Description	Office of the Secretary estimate	Air Force estimate	Difference
Cost estimate after considering cost reductions	\$54.7	\$51.0	\$3.7
Allowance for cost reductions that have not been implemented	(6.1)	(10.2)	4.1
<b>Net cost estimate</b>	<b>\$48.6</b>	<b>\$40.8</b>	<b>\$7.8</b>

Note: Parentheses indicate negative numbers.

Source: Office of the Secretary and Air Force data.

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<sup>4</sup> In late 1999, the Air Force adjusted the cost limitation to \$37.6 billion and revised the number of aircraft to be procured to 333 because 6 aircraft that were part of the production program will be procured as part of the development program and thus are now subject to a separate cost limitation for F-22 development.

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Consequently, as a result of the differences in estimating techniques and allowances for the cost reduction plans, the Office of the Secretary estimated the cost of the F-22 production program at about \$7.8 billion (19 percent) higher than the Air Force. Officials from the Office of the Secretary said they consider the 19 percent difference significant; however, they said that it will be some time before actual production cost trends emerge and before they will know whether the Air Force or Office of the Secretary of Defense estimate is more realistic. We agree that the difference is significant. If the Office of the Secretary estimate is correct and additional cost reduction plans are not developed and implemented, we calculated<sup>5</sup> that the Air Force would have to buy about 85 fewer aircraft than are now planned to stay within the congressional cost limitation of \$39.8 billion. A cost estimator of the Office of the Secretary said the number of aircraft that would be unaffordable would be between 75 and 90, depending in part on decisions about the production rate that would apply.

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#### Air Force Selected Cost Limitation as Its Official Cost Position

Although the Air Force cost estimate was \$40.8 billion, senior Air Force officials set the official cost position at the congressional cost limitation of \$39.8 billion. According to Air Force officials, the Air Force would normally select an estimated cost that would provide an equal chance that the estimate was either higher or lower than the actual cost of the program. For the F-22 production cost estimate, that amount was \$40.8 billion, which included about \$1.2 billion for risk uncertainties. The Air Force, however, used \$39.8 billion (the congressional cost limitation amount) as its cost position, which, according to Air Force calculations, was twice as likely to be below the actual cost than above it. The Air Force said it selected the \$39.8 billion as its cost position because the detailed breakout of the estimate by fiscal year was equal to or less than what the Air Force budgeted for fiscal years 2001 through 2005, and the estimate for the years beyond 2005 was more uncertain; that is, the further in the future the estimate is for, the less likely it is to be accurate. Therefore, rather than select an estimate that exceeds the cost limitation, the Air Force selected an estimate equal to the cost limitation.

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#### Conclusions

Our review of the airframe contractor's most significant cost reduction plans indicates that the Air Force may not be able to achieve the expected

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<sup>5</sup> The calculation is described under the caption Objectives, Scope, and Methodology.

results because they are beyond the Air Force's ability to control. This is because some planned cost reductions require decisions or later determinations by the Office of the Secretary or the Congress.

While the status of individual cost reductions is tracked by contractors and the Air Force's program office, the Air Force has not regularly reported to the Under Secretary of Defense on the status of these plans so their overall progress and their impact on the estimated cost of F-22 production can be assessed. We believe achievement of the estimated cost reductions embodied in the plans is so critical to completing F-22 production within the congressional cost limitation that quarterly reporting of summary information would be important and useful. Regular reporting on the status would provide a picture of how many cost reduction plans are being considered at that point in time, how many are implemented, their potential value, how many have resulted in actual cost reductions, and what those cost reductions are. Over time, a trend of progress in moving from plans to actual cost reductions should emerge and successful initiatives—beneficial "lessons learned" to other acquisition programs—would be highlighted.

After incorporating potential cost reductions, both the Office of the Secretary and the Air Force produced cost estimates for the F-22 production program that exceeded the congressionally mandated cost limitation in effect at the time the estimates were made. The Air Force estimate exceeded the limitation by about \$1.0 billion, while the Office of the Secretary estimate exceeded the limitation by \$8.8 billion. If the Office of the Secretary estimate is correct and additional cost reduction plans are not developed and implemented, the Air Force would have to buy about 85 fewer aircraft than now planned to stay within the congressional cost limitation. In addition, based on the uncertainties associated with some of the plans, the Air Force and the Office of the Secretary estimates could rise even more above the congressional cost limitation if the decisions by the Congress and the Office of the Secretary do not coincide with the decisions assumed in the cost reduction plans.

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## Recommendations

To enhance the visibility of the Air Force's plans to reduce production costs, we recommend that the Secretary of Defense direct the Air Force to report to the Under Secretary of Defense for Acquisition, Technology, and Logistics on the status of the production cost reduction plans each quarter. For each contractor, this report should include, as a minimum, summary information such as the total number of cost reduction plans identified, the number implemented, the total estimated reductions, and the reductions

realized to date. The report should also highlight major changes, such as additions or deletions from the list of plans, from the previous report.

Since both Office of the Secretary and the Air Force cost estimators projected that the F-22 production costs would exceed the congressionally imposed cost limitation and the possibility exists that these cost estimates could increase further if some cost reductions do not materialize, we further recommend that the Secretary of Defense reconcile the number of F-22s that need to be procured with the congressional cost limitation and report to the Congress on the implications of procuring fewer F-22s because of potentially higher costs.

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## Agency Comments and Our Evaluation

In written comments on a draft of this report, the Department of Defense disagreed with one recommendation and partially agreed with the other recommendation. The Department noted that the report provides a credible description of the historical cost estimating differences between the Office of the Secretary and the Air Force. However, the Department said that the report did not recognize the degree of detail to which the Office of the Secretary of Defense is already tracking the cost status of the F-22. With regard to our first recommendation that the Air Force report on the status of production cost reduction plans, the Department indicated that it has continually emphasized cost control on the F-22 program and since the imposition of the congressional cost limitation, has required the Air Force to provide quarterly briefings on production costs. The Department indicated that the quarterly reviews are structured to track the progress of key cost reduction plans when significant new data is available. The Department stated that it considers reporting on each production cost reduction plan unnecessary and did not believe additional direction from the Secretary of Defense regarding reporting of cost reduction plans was warranted. As a result of the Department's comments, we modified the recommendation in the final report to make it clear that the information that should be reported is summary information and not detailed information about each cost reduction plan. We recommend that the Air Force's quarterly report, which is already required to be submitted to the Under Secretary of Defense, include information such as the total number of cost reduction plans identified, the number implemented, the total estimated reductions, and the reductions realized to date. We also indicate that the information provided should highlight major changes, such as additions and deletions from the past list of plans, from the previous report. We believe that achievement of the cost reduction plans is so critical to completing F-22 production within the cost limitation that quarterly reports

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that include a summary of the status of the plans would be important and useful.

The Department partially agreed with our recommendation to reconcile the number of F-22s that need to be procured within the congressional cost limitation and report to the Congress on the implications of procuring fewer F-22s. The Department stated that it was premature for the Secretary of Defense to reconcile the number of F-22s with the congressional cost limitation. However, the Department also noted that the Quadrennial Defense Review planned for next year will examine the force structure requirements to execute national security policy objectives and will address the quantity of F-22s that can be procured within the cost limitation, and the results will be made available to the Congress. We believe the Department's upcoming review will be responsive to our recommendation.

The Department's comments are reproduced in appendix II. The Department also suggested additional technical changes, which we incorporated in the report where appropriate.

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We are sending copies of this report to Senator John W. Warner, Chairman, and Senator Carl Levin, Ranking Minority Member, Senate Committee on Armed Services; Senator Ted Stevens, Chairman, and Senator Daniel K. Inouye, Ranking Minority Member, Subcommittee on Defense, Senate Committee on Appropriations; Representative Floyd D. Spence, Chairman, and Representative Ike Skelton, Ranking Minority Member, House Committee on Armed Services; Representative Jerry Lewis, Chairman, and Representative John P. Murtha, Ranking Minority Member, Subcommittee on Defense, House Committee on Appropriations; and Representative Rod Blagojevich, Ranking Minority Member, Subcommittee on National Security, Veterans Affairs, and International Relations, House Committee on Government Reform. We are also sending copies of this report to the Honorable William Cohen, Secretary of Defense; the Honorable F. Whitten Peters, Secretary of the Air Force; and the Honorable Jacob Lew, Director, Office of Management and Budget. Copies will also be made available to others on request.

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Please contact me at (202) 512-4841 if you or your staff have any questions concerning this report. Additional points of contact and key contributors to this report are listed in appendix III.

Sincerely yours,



Allen Li  
Associate Director  
Defense Acquisitions Issues

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# Objectives, Scope, and Methodology

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Our overall objective was to determine the impact production cost reduction plans are projected to have on F-22 production cost estimates. Specifically, we (1) reviewed the status of cost reduction plans, evaluated some plans, and reviewed the Air Force reporting on the status of the plans and (2) compared the 1999 production cost estimates by the Office of the Secretary of Defense and the Air Force with the congressional cost limitation.

To assess the status of cost reduction plans, we reviewed the specific contractor cost reduction plans to determine the basis for the reductions expected to be achieved and whether the reduction was implemented or yet to be implemented. We reviewed the documentation from the contractors and discussed the plans and the Air Force procedures for reporting on such plans with contractor and Air Force officials. We also reviewed federal acquisition regulations and relevant laws. To evaluate a sample of the cost reduction plans, we judgmentally selected 10 of the plans that were projected to have high dollar values. The estimated reductions from these plans were \$6.8 billion.

To compare the recent F-22 production cost estimates of the Air Force and the Office of the Secretary of Defense with the congressional cost limitation and to determine the amount of cost reductions considered in those estimates, we reviewed the Joint Estimating Team's report and various Air Force briefings. We discussed the estimates with officials in the Office of the Secretary of Defense and the Air Force's F-22 program office to determine why they differed. We compared the two estimates, including the baseline estimate, the estimated reductions from reduction plans, and the net estimates. We obtained a description of the reasons for the variances between the two estimates. We also discussed the estimates and the cost limitation with Air Force and Office of the Secretary of Defense officials.

We determined what the congressional cost limitation was at the time these cost estimating groups prepared their estimates and compared it with the two estimates.

To calculate the number of F-22s that could not be procured within the cost limitation if the higher cost estimate of the Office of the Secretary were realistic, we considered that the cost limitation was 18.2 percent lower than the cost estimate by the Office of the Secretary, and that the later aircraft to be procured would generally be those with the lowest cost. We determined

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**Appendix I**  
**Objectives, Scope, and Methodology**

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the number of aircraft, beginning with those planned to be procured last, that could not be procured if funding were 18.2 percent short.

In performing our work, we obtained information and interviewed officials from the Cost Analysis Improvement Group, Office of the Secretary of Defense, Washington, D.C.; the Air Force Cost Analysis Agency, Washington, D.C.; the F-22 System Program Office, Wright-Patterson Air Force Base, Ohio; the Defense National Stockpile Center, Fort Belvoir, Virginia; Lockheed Martin Aeronautical Systems, Marietta, Georgia; Lockheed Martin Tactical Aircraft Systems, Fort Worth, Texas; and RAND Corporation, Washington, D.C.

We requested comments on a draft of this report from the Department of Defense. We obtained comments from the Director, Strategic and Tactical Systems, Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. Those comments are reproduced in appendix II. The Director also suggested additional technical changes, which we incorporated in this report where appropriate.

We performed our work from November 1999 through June 2000 in accordance with general accepted government auditing standards.

# Comments From the Department of Defense

Note: GAO's comments supplementing those in the report text appear at the end of this appendix

**OFFICE OF THE UNDER SECRETARY OF DEFENSE**  
3000 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3000

ACQUISITION AND TECHNOLOGY

17 JUL 2000

Mr. Allen Li  
Associate Director, Defense Acquisitions Issues  
National Security and International  
Affairs Division  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Li:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "DEFENSE ACQUISITIONS: F-22 Total Production Cost Estimates Exceed Congressional Limitation," dated June 12, 2000 (GAO Code 707459/ OSD Case 2033).

The draft GAO report does a credible job of documenting the historical cost estimating differences between Office of the Secretary of Defense (OSD) and the Air Force, and in providing examples of the Production Cost Reduction Plans (PCRP) that are being pursued. However, the draft report fails to recognize 1) the degree of detail to which OSD is already tracking the cost status on F-22, 2) the validity of the factors that lead to estimating differences between OSD and the Air Force, and 3) the fact that it will be some time before we know whether the OSD or the Air Force cost estimate is more realistic. As actual costs of the Production Representative Test Vehicles emerge, we will get an indication of which estimate the trends are following.

The DoD has continually emphasized cost control on the F-22 program. After the imposition of the congressional cost caps by the National Defense Authorization Act for FY1998, the DoD has further increased its emphasis on cost control. In approving production of the two-aircraft lot in December 1998, the Under Secretary of Defense for Acquisition, Technology, and Logistics directed the Air Force to provide him with quarterly briefings on development and production costs. The Department has used these special quarterly reviews to examine cost and schedule trends, and to track program status to a higher degree of fidelity.

These quarterly reviews have been structured to specifically track the cost and schedule variances, to compare the OSD and Service cost estimates, and to track the progress of the PCRPs. Because there are approximately 1240 individual PCRPs for the F-22 program, OSD does not report on the status of each of these at the quarterly reviews. Rather, we report on the status of the key PCRPs when significant new data exist on them. We plan to continue this practice in the future.



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**Appendix II**  
**Comments From the Department of Defense**

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See comment 5.

The Department believes it is premature for the Secretary of Defense to reconcile the number of F-22s that need to be produced with the congressional cost limitation and report to the Congress on the implications of procuring fewer F-22s because of potentially higher costs. A Quadrennial Defense Review (QDR) planned for next year will once again evaluate the force structure needs of the Department, and will address the affordability of planned programs such as the F-22. The QDR evaluation of cost trends on the F-22 should provide a better understanding of the quantity of F-22s that can be procured within the proposed DOD budgets and that remain within the congressional cost cap. The results of this QDR will be made available to the Congress. Once this review is completed, the Department will update the annual Selected Acquisition Report on F-22, and will make adjustments to quantities, if needed, to conform to the congressional cap and/or planned budgets.

The Department does not believe that any additional direction by the Secretary of Defense is needed at this time regarding visibility into the PCRPs, nor in determining the number of F-22s that can be procured within the congressional cost cap. Additional detailed comments on the report have been provided separately.

The Department appreciates the opportunity to comment on the draft report.

Sincerely,

  
George R. Schneiter  
Director  
Strategic and Tactical Systems

Enclosure

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**Appendix II**  
**Comments From the Department of Defense**

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GAO DRAFT REPORT DATED JUNE 12, 2000  
(GAO Code 707459/OSD CASE 2033)

**"DEFENSE ACQUISITIONS: F-22 Total Production Cost Estimates Exceed Congressional Limitation"**

**DOD COMMENTS TO THE GAO RECOMMENDATIONS**

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**RECOMMENDATION 1:** To enhance the visibility of the Air Force's plans to reduce production costs, the GAO recommended that the Secretary of Defense direct the Air Force to report to the Under Secretary of Defense for Acquisition, Technology, and Logistics on the status of the production cost reduction plans each quarter. For each contractor, this report should include, as a minimum, information such as the total number of cost reduction plans identified, the number implemented, the total estimated reductions, and the reductions realized to date. The report should also highlight major changes, such as additions or deletions from the list of plans from the previous report.

**DOD RESPONSE:** Nonconcur. The quarterly reviews to the USD(AT&L) are structured around overall program cost and schedule status. At these meetings, the Air Force provides information outlining how the F-22 program is performing against cost and schedule targets. In addition to the Air Force report, the OSD cost estimators give the USD(AT&L) an independent assessment of the cost to complete, and the affordability of the program. As a part of this cost and affordability status, the Production Cost Reduction Plans (PCRPs) are considered because they are integral to the program meeting affordability objectives. There are approximately 1240 individual PCRPs being tracked on F-22. The Department does not report on the status of each of these at the quarterly reviews. The Department considers reporting on each PCRP at each quarterly unnecessary to understanding the overall cost and affordability picture on F-22. The Department reports on the status of key PCRPs when significant new data exist on them. However, the data on each PCRP have always been available as back-up material. This practice will continue in the future. We do not believe that additional direction from the Secretary of Defense regarding reporting of PCRP information is warranted.

**RECOMMENDATION 2:** Since both Office of the Secretary and Air Force cost estimators projected that the F-22 production costs would exceed the congressionally imposed cost limitation, and the possibility exists that these cost estimates could increase further if some cost reductions do not materialize, the GAO recommended that the Secretary of Defense reconcile the number of F-22s that need to be produced with the congressional cost limitation and report to the Congress on the implications of procuring fewer F-22s because of potentially higher costs.

See comment 4.

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**Appendix II**  
**Comments From the Department of Defense**

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See comment 5.

**DOD RESPONSE:** Partially Concur. Regardless of the current OSD and Service cost estimates on the F-22 program, the Department believes it is premature for the Secretary of Defense to reconcile the number of F-22s that need to be produced with the congressional cost limitation, and report to the Congress on the implications of procuring fewer F-22s because of potentially higher costs. Time will tell whether either of these estimates is correct. The Quadrennial Defense Review (QDR) planned for next year will once again examine the Department's force structure requirements necessary to execute stated national security policy objectives. The QDR will address the affordability of planned programs such as the F-22. The QDR evaluation of cost trends on the F-22 should provide a better understanding of the quantity of F-22s that can be procured within the proposed DOD budgets and that remain within the congressional cost cap. The results of this QDR will be made available to the Congress. Once this review is completed, the Department will update the annual Selected Acquisition Report on F-22, and will make adjustments to quantities, if needed, to conform to the congressional cap and/or planned budgets.

The following are GAO comments on the Department of Defense's letter dated July 17, 2000.

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## GAO Comments

1. We included additional information in the report about the cost data available to the Under Secretary of Defense to assess the status of the F-22 program.
2. An objective of this report was to compare the 1999 Air Force and Office of the Secretary cost estimates with the congressional cost limitation. Our objectives did not include an assessment of the validity of the factors used by the Air Force or Office of the Secretary to arrive at their cost estimates. Our report did not intend to determine whether the Air Force or Office of the Secretary used the more appropriate factors.
3. We have included in the report as appropriate the Department's statement that it will be some time before they know which cost estimate is more realistic.
4. We revised the report to include additional information regarding the data presented to the Under Secretary during the quarterly reviews. We note that the Air Force last provided summary information to the Under Secretary of Defense regarding production cost reduction plan data during the quarterly review in June 1999. According to the Air Force, similar information was provided as backup, but apparently not briefed, in September 1999. Since successful implementation of production cost reduction plans is critical to the Air Force's ability to keep the cost of F-22 production within the congressional limitation, and the summary data such as we recommended have not been provided on a regular basis to the Under Secretary, we continue to recommend that the data be reported quarterly.
5. We recommended in our draft report that the Secretary of Defense reconcile the number of F-22s that need to be procured within the congressional cost limitation and report to the Congress on the implications of procuring fewer F-22s because of potentially higher costs. The Department of Defense said it was premature for the Secretary of Defense to reconcile the number of F-22s that need to be procured. The Department, however, partially agreed with this recommendation and stated that it plans to do a review next year to evaluate force structure needs, which will include addressing the

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**Appendix II**  
**Comments From the Department of Defense**

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affordability of the F-22. The review will evaluate cost trends on the F-22 and should provide a better understanding of the number of F-22s that can be bought within the cost limitation. The planned review by the Office of the Secretary of Defense should be responsive to our recommendation.

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# GAO Contact and Staff Acknowledgments

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## GAO Contact

Robert D. Murphy (937) 258-7904

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## Acknowledgments

In addition to the name above, Mark Abraham, Leonard L. Benson, Christopher T. Brannon, Edward R. Browning, and John Van Schaik made significant contributions to this report.

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